Mobile County, Alabama Air Quality Study

EPA Science Forum 2004

June 2, 2004

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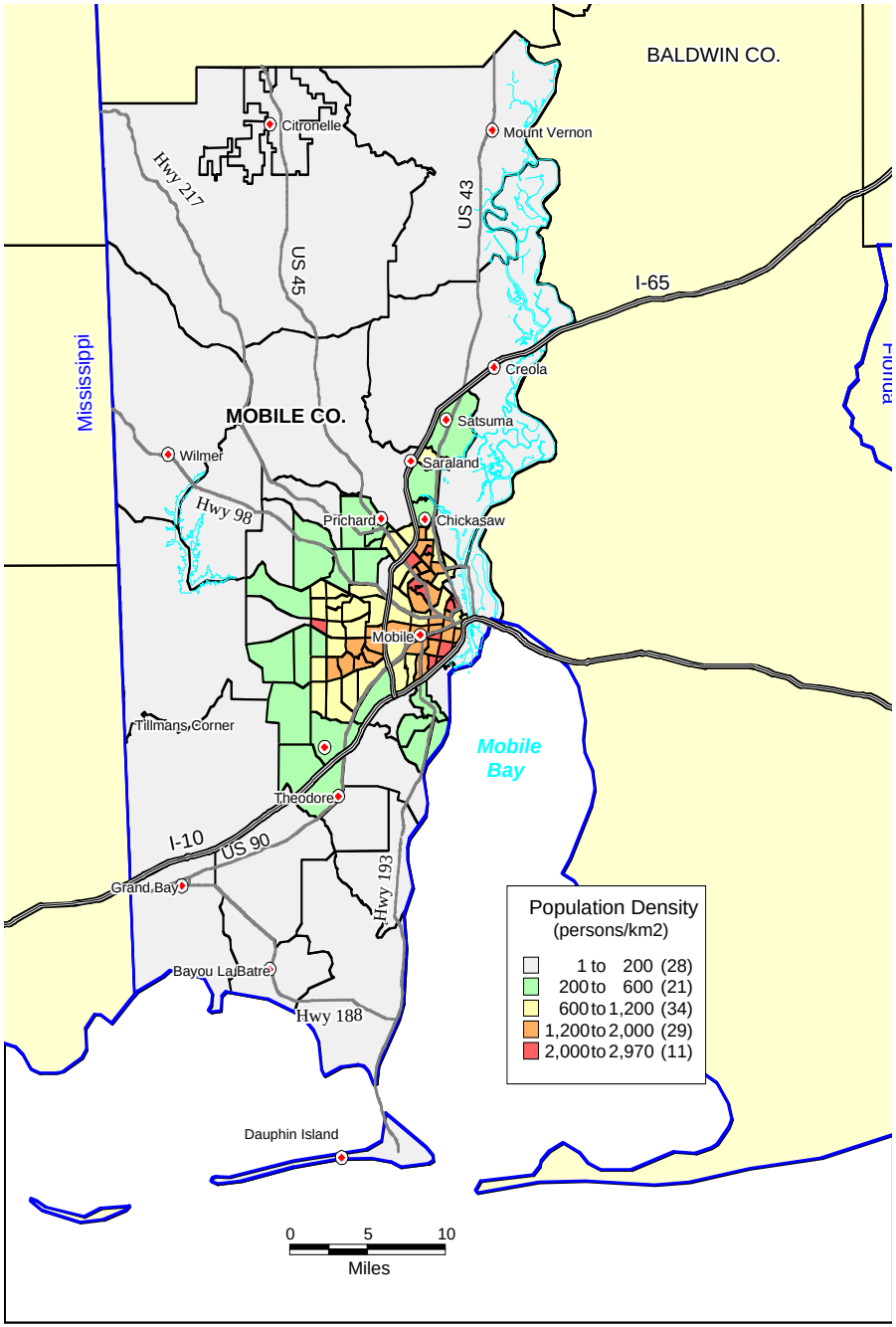
THE FORUM, *Industry Partners in Environmental Progress*

Mobile County

- Facts
  - About 1500 sq. miles
  - ~500,000 people
  - 2 Interstates
  - 4 major railroads
  - Port
  - Recreation & Tourism



Air Study - Mission

- To successively evaluate the existing air quality of Mobile County;
- To determine a community-based expectation for our county's air quality – a safe, healthy threshold of all significant "ingredients" of our air quality; and
- To propose and help bring about the necessary actions needed to achieve and maintain our community-based air quality expectations

Purpose

To:

- Only consider Toxics, not Criteria Pollutants

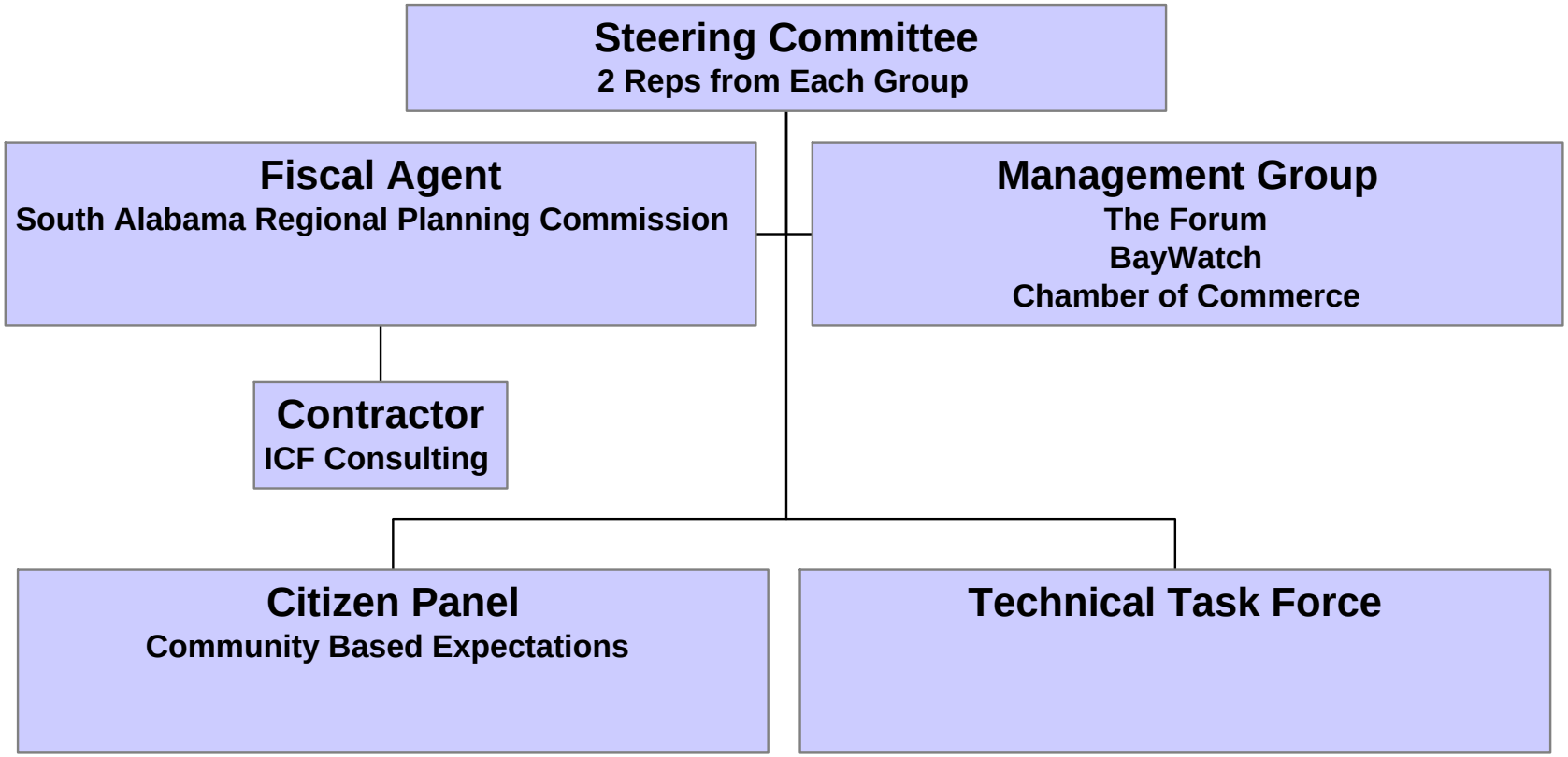
Is Not To Be:

- Regulatory
- A Health Study
- An On-going Monitoring Program

Players

- City of Mobile
- Mobile County
- Mobile Bay Watch/Baykeeper
- Mobile Area Chamber of Commerce
- The Forum, Industry Partners in Environmental Progress

Organization



Background

- Industrial Expansion Opposition - Fall ‘97
- Ozone Issue & GLORI - Fall ‘98
- Informal Meetings - Fall ‘98 - Spring ‘99
- Prichard Study (EPA) - January ‘99
- Media - Summer ‘99
- State Board of Health - Summer ‘99

Background

- Mayor's Actions - July '99
- Steering Committee - August '99
- Task Force - October '99
- RFP for Scope - Dec '99
- Select vendor for Scope - February '00
- Scope prepared - Fall '00

Cost

Initial Cost Estimate

$750,000 - $800,000

Initial Funding

City of Mobile	$ 150,000
Mobile County	$ 150,000
Mobile Bay Watch	$ 150,000
Chamber	$ 150,000
The Forum	$ 150,000
Total	$ 750,000

Final(?) Funding

City of Mobile	$ 150,000
Mobile County	$ 150,000
Mobile Bay Watch	$ 150,000
Chamber	$ 150,000
The Forum	$ 150,000
EPA	$ 150,000
State of Alabama	$ 300,000
Total	$ 1,200,000

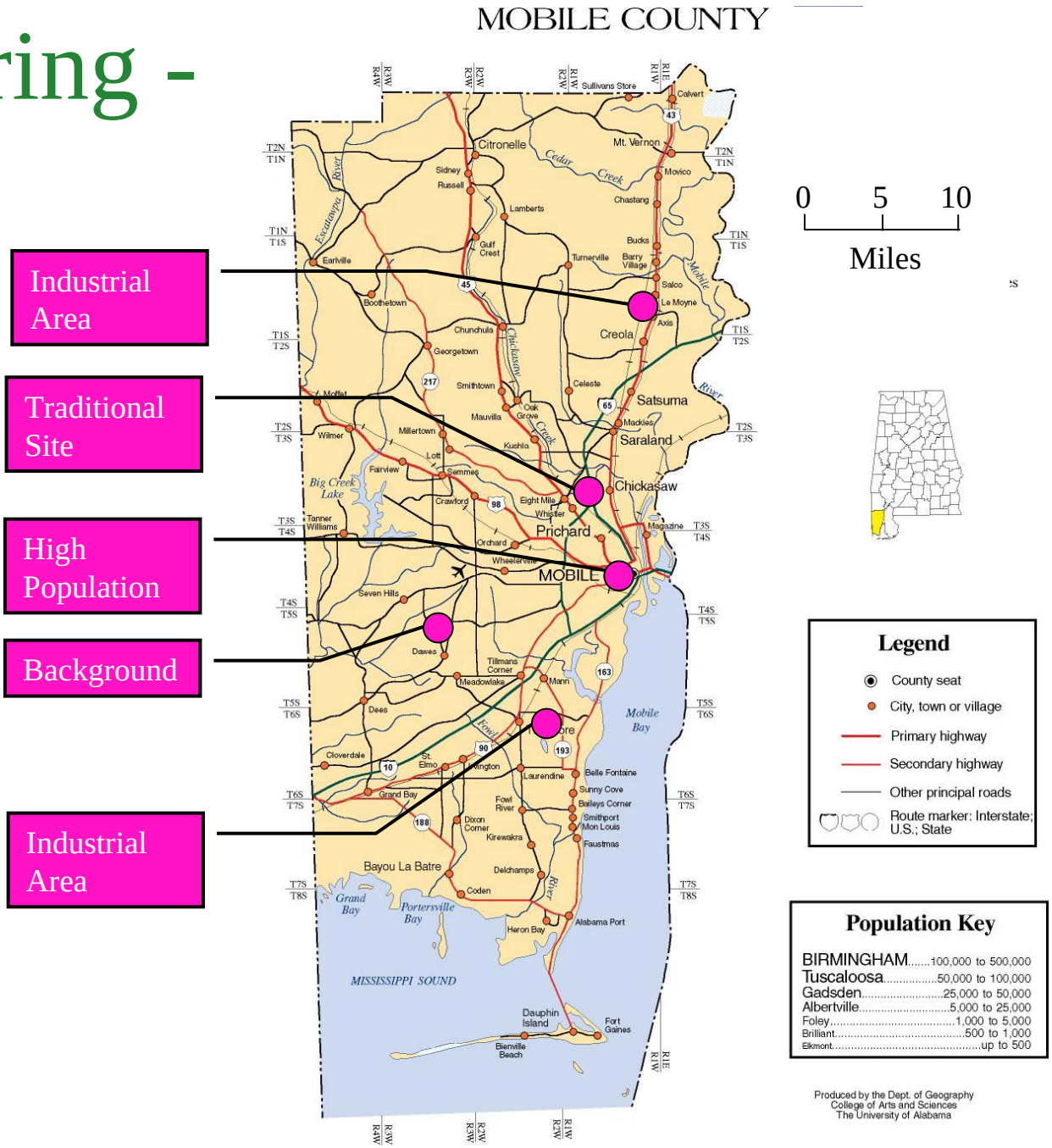
Scope

- Air Monitoring
- Air Modeling
- Community Based Expectations

Air Monitoring - What

- VOC’s
- Carbonyls (formaldehyde & acetaldehyde)
- Metals
- PAH & PCD

Air Monitoring - Where



Air Monitoring - When

- One-year sampling
- Randomly selected dates
- 60 samples per location

THE PARTNERS IN ENVIRONMENTAL PROGRESS FORUM

- 6 - XonTech 910a Samplers (VOC)
- 6 - XonTech 924 Samplers (Filter)
- 48- SUMMA Canisters

Modeling

- ASPEN
- 2x2 km grids
- Predict Concentrations
- “Ground Truth” with Monitoring
- Predict Exposures using HAPEM4

Community Based Expectations

- Multi-year process
- 20-35 people in Workgroup
- 6-9 months education
- Had no pre-conceived ideas of what form the expectations would take
  - Qualitative
  - Quantitative
  - Risk Based
  - Concentration Based

Community Based Expectations - Process

- Established Rules
- Agreed on Education Needs
- Set Targets
- Established a Sub-Committee (Finally)
- Received Sub-Committee Reports
- Issued Recommendations to Steering Committee
- Information sharing Website
  - QuickPlace software
  - Hosted by Consultant - ICF Consulting

Community Based Expectations (con't)

- Sub-Committee to make recommendations

Bill Klutz	Dr. Roy Martino	Ofia Hodoh
Steve Perry	Lisa Hirsh	Paul Wagner
Casi Callaway	Tina Sanchez	John Klotz
Harritta Eaton	Bethany Carl	

- Carcinogens & Others,
- Geographics & Demographics
- Met weekly

  late March 2003 to mid-January 2004

Report on Carcinogens

By the
Community Based Expectations
Sub-Committee

August 25, 2003

Process Followed - Compounds

- Confirmed Monitor/Model List of Compounds
- Developed List of Carcinogens
- Determined Class of Carcinogen based on “Weight of Evidence”
- Developed the “Inhalation Unit Risk” (IUR) for each Carcinogen

Process Followed - Geography

- Reviewed Census Track vs Grid Square method
- Reviewed using ambient concentrations vs projected exposure
- Reviewed demographic alternatives

Process Followed - Risk

- Researched using a concentration base expectation vs a risk based expectation
- Researched other's opinion concerning level of risk
  - EPA
  - California
  - Louisiana
  - North Carolina
  - Texas
- Developed a means of expressing an expectation

Definitions

- **Risk Level** – An evaluation of an individual's increased risk of cancer over a seventy- (70) year period caused by exposure to a carcinogen being evaluated. It is determined by multiplying the predicted annual average exposure concentration for a carcinogen by its Inhalation Unit Risk (IUR) estimate. The Risk Level is expressed as a probability of 1 in some number, such as 1,000,000.
- **CBE Acceptable Risk Level** –The Acceptable Risk Level is less than 1 in 1,000,000 ($1x10^{-6}$).

Definitions (con't)

- **CBE Cumulative Risk** – The total risk for an area, determined by adding the individual risks of all carcinogens in the area being evaluated.
- **CBE Risk Requiring Evaluation**–Any individual carcinogen risk at or above 1 in 1,000,000 ($1x10^{-6}$)
- **Community Based Expectation of Risk (CBER)** – The CBER is the sum of all Risk for a given area that do not exceed 1 in 10,000 ($1x10^{-4}$). If the CBER is exceeded in any area, Risk Management is highly recommended.

Definitions (con't)

- **CBE Risk Evaluation** – All carcinogens, or groups of carcinogens with exposure above the Acceptable Risk level, even though not contributing to risk above the CBER, may be evaluated to determine if there is also a need for Risk Management for these carcinogens.
- **CBE Risk Management** – Actions to reduce the risk from exposure of a compound, or group of carcinogens that takes into account the political, social, economic and engineering implications together with the risk related information.

Simple Statement

- Risk at less than 1 in 1,000,000 is acceptably low
- If sum of all risks in an area is between 1 in 10,000 and 1 in 1,000,000 then some evaluation will be called for
- If that sum is greater that 1 in 10,000 the cause should be examined and reductions considered based on political, social, economic and engineering implications.

Report on Non-Carcinogens

By the
Community Based Expectations Sub-Committee

January 26, 2004

Process Followed - Compounds

- Confirmed Monitor/Model List of Compounds
- Developed List of Non-Carcinogens
- Developed Understanding of
  - Hazard Quotient,
  - Hazard Index
  - Reference Concentration (RfC)
  - Uncertainty Factor
  - LOAEL
  - NOAEL
- Researched and Developed Listing for each Compound's
  - RfC
  - Non-carcinogenic Effect(s)

Process Followed - Geography

- Confirmed Decisions made during Carcinogens Analysis
  - Affirmed use of Grid Squares vs. Census Tracks
  - Affirmed use of Projected Exposures from Model
  - Affirmed use of 10 Demographic Groups (Male/Female & 5 Age Categories)

Process Followed - Risk

- Researched logic of using Hazard Quotients for Individual Compounds
- Researched logic of using Hazard Indices for Multiple Compounds
- Developed a means of expressing an expectation
- Developed Conceptual approach to Risk Evaluation/Risk Management

Process Followed - Risk

- Non-Carcinogenic Risk
  - Probability of negative effect is not linear with exposure
  - Hazard Quotient at 1.0 gives indication of “break point”
  - Different compound cause different effects
    - Health Impacts
    - Physiological Impacts
  - Risk evaluation could be a resource intensive task.

Definitions

- **Hazard Quotient:**

  The **ratio** of the potential exposure to the substance and the level at which **no adverse effects are expected**. If the Hazard Quotient is calculated to be less than 1, then no adverse health effects are expected as a result of exposure. If the Hazard Quotient is greater than 1, then adverse health effects are possible. The **Hazard Quotient cannot be translated to a probability** that adverse health effects will occur, and is **unlikely to be proportional to risk**. It is especially important to note that a **Hazard Quotient exceeding 1 does not necessarily mean that adverse effects will occur**

Definitions (con't)

- **Hazard Index (HI)** – The sum of the individual HQs. This may serve as an indicator of the need for further risk evaluation An HI less than 1.0 indicates that exposure to multiple chemicals is expected to be without adverse effect on human health, even for sensitive populations.
- **CBE Acceptable Exposure** –If the projected concentration in a grid square of a particular compound is less than the R_fC for that compound (HQ < 1.0) and the sum of all HQs is less than 1 (HI < 1.0) the exposure is acceptable and is expected to be without any anticipated adverse impacts, even for sensitive populations.
- **CBE Exposure Requiring Evaluation** –Hazard Indices (HI) will be calculated for the demographic groups and geographic areas being evaluated. If these HI exceed 1.0, Risk Evaluation will occur.

Definitions (con't)

- **Community Based Expectation of Exposure Hazard (CBEEH)** –

  The CBEEH is that

  - The HQ from exposure to any compound in any area is less than 1.0; if this is not achieved CBE Risk Evaluation and CBE Risk Management will occur.
  - The HI, calculated by summing all HQs for a given area and/or demographic group, will not exceed 1.0. If this expectation is not achieved, CBE Risk Evaluation will occur.

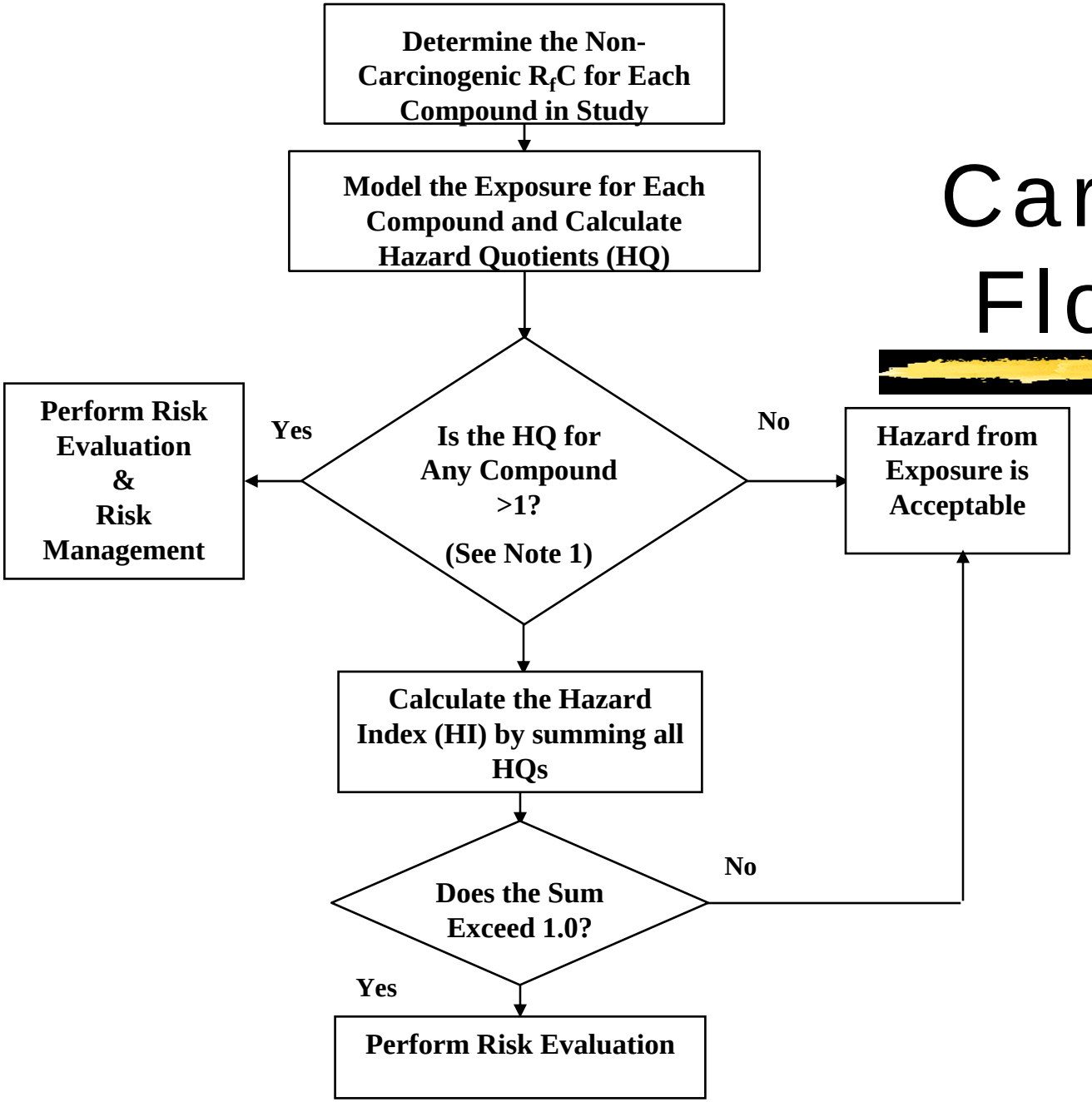
Definitions (con't)

- **CBE Risk Evaluation** –The hazard created by exposure to a compound or group of compounds will be evaluated to determine the risk that exposure presents. This evaluation is to determine if there is also a need for Risk Management. It is strongly recommended that this evaluation includes grouping compounds according to major effects categories including, neurotoxicity, developmental toxicity, reproductive toxicity, immunotoxicity and adverse effects by target organ.
- **CBE Risk Management** – Actions to reduce the hazard from exposure of a compound, or group of compounds that takes into account the political, social, economic and engineering implications together with the risk related information.

Simple Statement

- Exposure to any individual chemical at less than its R_fC (HQ < 1.0) is acceptable
- Exposure to multiple chemicals with an HI < 1.0 is acceptable
- If an HQ for an individual chemical is >1.0, Risk Evaluation and Risk Management will be conducted
- If an HI is >1.0, Risk Evaluation will be conducted to determine whether Risk Management is warranted.

Non-Carcinogen Flowchart



Note 1:

Does the Modeled Exposure Exceed the R_fC?

Where are we?

- Contract for Implementation - July ’01
- Monitors Installed - January ‘02
- Monitoring - August ‘02 - August ‘03
- Community Based Expectations - March ‘02 - January ‘04

Learnings/Recommendations

- Effort is necessary
- Don’t be bound by convention
- Take time to educate
- Modeling is necessary
- Embargo data